

# Notes 10/8 - Composition of Functions

Main idea  $\rightarrow$  putting one function inside another function

$$(f \circ g)(x) = f[g(x)]$$

first letter  
= outside  
function

inside  
function

$\rightarrow$  put  $g$  inside  $f$  wherever you see an "x"

$$(g \circ f)(x) = g[f(x)]$$

$\rightarrow$  put  $f$  inside  $g$  wherever you see an "x"

## Part 1 - Composition with Evaluating

- When you evaluate (plug in a number for  $x$ ) in composition, you're just evaluating twice. You get out a number for your answer.

Ex:  $f(x) = x^2 + 3x - 1$      $g(x) = 2x + 8$

$$(f \circ g)(2) = f[g(2)]$$

plug in  $x=2$

start on inside first

Step 1:  $g(x) = 2x + 8$

$$g(2) = 2(2) + 8 = 4 + 8 = 12$$

Step 2:  $f(12) = (12)^2 + 3(12) - 1$

$$= 144 + 36 - 1 = 179$$

$$f(x) = x^2 + 3x - 1 \quad g(x) = 2x + 8$$

$$\text{Ex 2: } (g \circ f)(-4) = g[\underline{f(-4)}]$$

$$\begin{aligned} \text{S1: } f(x) &= x^2 + 3x - 1 \\ f(-4) &= (-4)^2 + 3(-4) - 1 \\ &= 16 - 12 - 1 = 3 \end{aligned}$$

$$\begin{aligned} g[3] &= 2(3) + 8 \\ &= 6 + 8 = 14 \end{aligned}$$